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CANADIAN PATENT

⑤

DISPENSERS

⑦

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Granted to The Metal Box Company Limited, London,
England

②

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PRIORITY DATE

No. OF CLAIMS 9

BACKGROUND OF THE INVENTION

The invention relates to dispensers such as for use in dispensing flowable substances from containers.

5 Dispensers are known comprising a nozzle and a screw-on or press-fit cap. Such dispensers may be attached to or integral with an open end of a container holding a flowable substance. Known dispensers of this form may be made of plastics material.

10 It is also known to secure the cap to the nozzle by means of a hinge which may also be made of plastics material. Such hinges are advantageous since they prevent loss of the cap.

15 However, a disadvantage of such hinges is that they allow the cap to fall back over the open end of the nozzle during dispensing, unless the cap is held in the open position or unless the attitude of the container is such that gravity prevents such movement.

20 Hinge constructions have been proposed which, when the cap is in the open position, develop a detent force that tends to hold the cap in this position and has to be overcome before the cap can be moved to the closed position. However, these constructions are either excessively complicated in design involving a multitude of hinge links and the use of two spaced, side by side, hinge axes, or provide no proper location of
25 the hinge axis which may make the operation of the detent haphazard.

It is an object of the invention to provide an improved dispenser for dispensing a flowable substance.

BRIEF SUMMARY OF THE INVENTION

30 According to the invention, there is provided a dispenser



10 for dispensing a flowable substance comprising a nozzle formed of resilient plastics material and defining an open end, a closure cap formed of resilient plastics material, a hinge hingably connecting the cap to the outside of the nozzle for relative movement between a closed position in which it closes the open end of the nozzle and an open position clear of the open end of the nozzle, the hinge being formed of resilient plastics material and comprising an arm having relatively rigid and relatively flexible portions so as to define a single hinge axis which is located spaced from and between the nozzle and the cap, and detent means made of resilient plastics material and mounted on one of the cap and the nozzle adjacent the hinge and arranged to engage the other thereof when the cap is moved towards the closed position, so as to develop an opposing force, greater than due to the inherent bending resistance of the hinge material alone, which force prevents the cap from moving further towards the closed position until overcome.

20 According to the invention, there is also provided a dispenser for dispensing a flowable substance, comprising a nozzle formed of resilient plastics material and defining an open end, a closure cap formed of resilient plastics material, and a hinge hingably connecting the cap to the outside of the nozzle for relative movement between a closed position in which it closes the open end of the nozzle and an open position clear of the open end of the nozzle, the hinge being formed of resilient plastics material and comprising an arm having relatively rigid and relatively flexible portions which portions define a single hinge axis located spaced from and between the nozzle and the cap and which portions have an interface which is curved in a plane transverse to the axis of the nozzle so that the line about which the plastics material preferentially tends to flex as the cap is moved towards the closed position is not coincident with the hinge axis

whereby distortion of the plastics material of the hinge takes place to produce an opposing force, greater than due to the inherent bending resistance of the hinge material alone, which prevents the cap from moving further towards the closed position until overcome.

BRIEF DESCRIPTION OF THE DRAWINGS

Dispensers embodying the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a transverse section through one of the dispensers, as applied to a collapsible toothpaste tube;

Figure 2 is an outside elevation showing the same dispenser newly moulded;

Figure 3 is a top plan on Figure 2;

Figure 4 is an inverted plan on Figure 2;

Figure 5 is a transverse section corresponding to Figure 1 but through another of the dispensers;

Figure 6 is a top plan on Figure 5;

Figure 7 is an end elevation on Figure 5;

Figure 8 is a transverse section of the dispenser

of Figure 5 but showing it in the closed position;

Figure 9 is a transverse section corresponding to Figure 1 but through a further one of the dispensers; and

Figure 10 is a top plan of the dispenser of Figure 9.

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DESCRIPTION OF PREFERRED EMBODIMENTS

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Figure 1 shows the top skirt 10 of a collapsible toothpaste tube, having a cylindrical nozzle 11 with an integral external circumferential bead 12. A paste dispenser 13 is fitted to the nozzle 11 by engagement of an annular bead 14 of the dispenser behind the bead 12, so that a nozzle 15 of the dispenser forms a continuation of the nozzle 11 of the tube.

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With reference now to Figures 1 to 4, the dispenser 13 is formed in one piece of resilient plastics material, for example low-density or high-density polyethylene or polypropylene. It comprises the nozzle 15 and a closure cap 16, which in the closed position shown in Fig.1 encloses the nozzle 15. The cap 16 has sealing means consisting of a spigot 17, which in the closed position seals the nozzle 15 by just engaging within the open end 18 of the nozzle. The cap 16 is hinged to the outside of the nozzle by means of an integral hinge 19 formed in an outwardly-projecting portion 20 of the nozzle, for movement between the closed position and an open position indicated by chain-dotted lines in Fig.1, in which the cap 16 is clear of the nozzle 15.

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As seen in Fig.3, the hinge 19 is curved so that it does not lie entirely on the hinge axis 31. Closing the cap tends to distort the flanks of the hinge resiliently so that it tends to bias the cap to the position in which the dispenser is moulded and in which it is shown in Figs.2 to 4.

The nozzle 15 is a frusto-conical and its open end 18 is inclined to the nozzle axis, the inclination being in a direction away from the hinge 19. The open end 18 of the nozzle need not be so inclined, however, but may be in a plane perpendicular to the axis. The bead 14 is formed inside the lower end of the nozzle 15.

The interior of the cap is tapered inwards towards its closed end, as indicated at 21, but the apex angle of the taper is less than that of the cone to which the nozzle 15 is formed, so that there is a space 22 around the nozzle, within the cap, when the cap is closed. Any excess paste left inadvertently on the outside of the nozzle 15 during use will be accommodated in the space 22. Extending around the lower end of the nozzle 15 (i.e. the end remote from its open end 18) is an external annular shoulder 23 which, when the cap is closed, is engaged by an annular bead 24 formed inside a lower skirt portion 32 of the cap. This secures the cap in the closed position and prevents it from being sprung open by the resilience of the hinge 19 mentioned above. Paste that may be trapped in the space 22 is prevented from escaping by the co-operating shoulder 23 and bead 24.

The lower skirt portion 32 of the cap 16 is cut away as indicated at 33 so as to accommodate the hinge strap 20, 25 in the closed position. As is best seen in Fig.3 the cutaway portion 33 interrupts the bead 24; and a curved sealing face 27 is formed on the inside of the cap across the interruption of the bead 24. A corresponding part-cylindrical face 26, continuous with the crest 34 of the shoulder 23, is formed on the nozzle 15. In the closed position, therefore, sealing between the cap 16 and nozzle 15 is achieved over most of

the circumference by engagement of the crest 34 with the bead 24, and over the remainder of the circumference by engagement of the face 27 with the face 26.

5 An integral foot 28 may be formed on the lower part of the projecting portion 20 of the nozzle, to support it rigidly on the skirt 10 of the tube when the hinge 19 is being operated.

10 The nozzle 15 may have an internal shoulder 29 (Figs. 1 and 4) against which the outer end of the tube nozzle 11 can abut.

A rough flat face 30 may be provided on the outside of the cap 16 to assist a finger or thumb in applying pressure for releasing the bead 24 from behind the shoulder 23, so as to open the cap.

15 Figs. 2 to 4 show the dispenser as it is formed in a mould by injection moulding, that is to say with the two projecting portions 20, 25 in a straight line with each other.

20 The dispenser of Figures 5 to 8, is, like the dispenser of Figures 1 to 4, formed (as by injection moulding) in one piece of resilient plastics material which may, for example, be low or high density polyethylene or may be polypropylene. The dispenser of Figures 5 to 8 may be used for attachment to a toothpaste tube like the dispenser of Figures 1 to 4. It comprises a nozzle 50 whose open end is perpendicular to the nozzle axis, and a closure cap 51. At its opposite end, the nozzle 50 has a bead 52 for engaging with a bead on the nozzle of the toothpaste tube in a manner similar to that shown in Figure 1 so as to hold the dispenser in position. The cap 51 is frusto-conical in shape and is open at both its ends. A wall 56 divides the cap into two halves. On one side of the

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wall, there is provided an annular collar 58.

5 The closure cap is hinged to the nozzle by means of two hinge arms 60, 62 (Fig.6). Each of these hinge arms has a thick portion 60A, 62A which extends rigidly from the underside of the lower peripheral edge of the nozzle 50, and a much thinner portion 60B, 62B which is attached to the peripheral edge of the wider end of the cap 51.

10 Associated with the hinge is a rigid detent member 64 which projects outwardly from a peripheral portion of the cap 51 near its wider end and between the hinge arms 60, 62.

15 In operation, the cap and the nozzle are hingable relative to each other by virtue of the flexibility of the thin hinge arm portions 60B, 62B, and the nozzle and cap therefore hinge relative to each other approximately about the line of join between the thick and thin hinge arm portions. Figure 5 shows the cap in its open position to allow dispensing of the toothpaste out through the upper end of the nozzle 50.

20 To close the nozzle, the cap 51 is lifted so as to turn about the hinge structure described above, and the wider open end of the cap closes over the nozzle 50 with the annular collar 58 engaging the upper end of the nozzle. The internal diameter of the annular shoulder 58 is arranged to be a tight fit on the external diameter of the upper part of the nozzle and, because of the angle at which the annular shoulder 58 approaches the nozzle 50 during the hinging motion, slight lifting of the cap and distortion of the shoulder 58 has to occur to allow the shoulder to snap over the nozzle 50. An inner peripheral chamfer on the shoulder 58 and an outer peripheral chamfer on the nozzle 50 aid this process.

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In the closed position of the cap, the hinge is stretched slightly as a result of the lifting action which is necessary to snap the shoulder over the nozzle, and the resultant stress in the hinge helps retain the cap 51 in the closed position.

When the cap 51 begins to move towards the closed position as described above, the detent 64 moves into engagement with the lower peripheral edge of the nozzle 50. Continued movement of the cap 51 causes slight bending of the detent member 64 and slight distortion of the lower peripheral edge of the nozzle 50 to allow the detent 64 to pass and permit the cap to move on into the closed position. The detent 64 therefore produces a force tending to hold the cap in the open position and prevents it interfering with a paste-dispensing operation.

The taper of the cap 51 provides a space 66 (Fig.8) which corresponds to the space 22 of the dispenser of Figure 1 and accommodates any excess paste which has accumulated around the nozzle 50. If the excess paste is too great in quantity to be accommodated in the space 66, then the closing operation of the cap 51 will push out this excess paste around the peripheral edge of the wider end of the cap. The peripheral edge then engages the side of the nozzle to form a secondary seal.

The narrower end of the cap 51 may be cut across at an angle with the aim of emphasising to the user that the cap is removed by a pushing and hinging operation instead of by a screwing operation. A flat 68 may be formed on one side of the cap for the same purpose.

The dispenser of Figures 9 and 10 is, like the other dispensers shown, formed (as by injection moulding) in one piece of resilient plastics material such as low density

polyethylene, and is arranged for attachment to the open end of a container from which a flowable substance is to be dispensed. It comprises a neck 80 for attachment to the container, the neck having an annular rib 82 for
5 facilitating this attachment. The upper end of the neck 80 is closed off by a diaphragm 84 to the centre of which a ring 86 is attached. The material is relatively weak along the circumferential line 88 of attachment between the diaphragm 84 and the upper end of the neck 80, and the
10 user can thus tear off the diaphragm 84 by means of the ring 86. Until the diaphragm is removed, however, the contents of the container are sealed in.

A cup-shaped nozzle 90 extends upwardly from the upper end of the neck 80 and has a turned-over annular lip 92.
15 At one peripheral point on this lip, a cap 94 is attached by means of a hinge 96 whose construction is similar to the hinge of the dispenser of Figure 5. The hinge 96 comprises two hinge arms 98, 100 each having a thick portion 98A, 100A extending from the lip 92 and a much thinner portion 98B, 100b which is attached to the outer periphery of the cap 94.
20 Associated with the hinge 96 is a rigid detent member 102 which projects outwardly from a peripheral portion of the cap 94 and between the hinge arms 98, 100.

The cap 94 has a generally flat top 104 from the under-
25 side of which projects a straight sided tubular extension 106 whose distal end has an annular lip 108.

In use, the cap 94 and the nozzle 90 are hingable relative to each other about the line of join between the thick and thin portions of the hinge arms 98, 100. As the
30 cap is moved to the closed position, the tubular cap

extension 106 enters the nozzle 90, and the lip 108 deforms and then resiles to seat in an annular recess 110 at the base of the nozzle. The open end of the nozzle is thus closed off by this engagement and by engagement of the tapered periphery 112 of the cap with the lip 92 of the nozzle.

When the cap 94 begins to move towards the closed position, the detent 102 moves into engagement with the periphery of the lip 92. Continued closing movement of the cap causes slight bending of the detent and of the lip 92 to allow the detent to pass and permit the cap to move on into the closed position. The detent 102 thus provides a force preventing inadvertent movement of the cap to the closed position.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:-

1. A dispenser for dispensing a flowable substance comprising

a nozzle formed of resilient plastic material and defining an open end,

a closure cap formed of resilient plastic material,

a hinge hingably connecting the cap to the outside of the nozzle for relative movement between a closed position in which it closes the open end of the nozzle and an open position clear of the open end of the nozzle, the hinge being formed of resilient plastic material and comprising an arm having relatively rigid and relatively flexible portions so as to define a single hinge axis which is located spaced from and between the nozzle and the cap, and

detent means made of resilient plastic material and mounted on one of the cap and the nozzle adjacent the hinge and arranged to engage the other thereof when the cap is moved towards the closed position, so as to develop an opposing force, greater than due to the inherent bending resistance of the hinge material alone, which force prevents the cap from moving further towards the closed position until overcome.

2. A dispenser according to claim 1, in which stress in the plastic material when the cap is in the closed position tends to hold the cap in the closed position.

3. A dispenser according to claim 1, in which the nozzle and the cap are so shaped that in the closed position one of them is at least partially inserted in the other so as to define a closed clearance space between the nozzle and the cap.

- 13 -

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4. A dispenser according to claim 3, in which the nozzle is tapered inwardly towards its said open end, the cap being of hollow form and defining an open end and a closed end whereby, when the cap is in the closed position, the nozzle projects through the open end of the cap and the said clearance space is provided between the outer wall of the nozzle and the inner wall of the cap.

5. A dispenser according to claim 4, in which the said closed end in the cap carries a projection which engages and seals the open end of the nozzle when the cap is in the closed position.

6. A dispenser according to claim 3, in which the cap is arranged to engage the nozzle, when in the closed position, in a region adjacent the open end of the cap so as to provide a further seal between the cap and the nozzle.

7. A dispenser for dispensing a flowable substance, comprising

a nozzle formed of resilient plastic material and defining an open end,

a closure cap formed of resilient plastic material, and

a hinge hingably connecting the cap to the outside of the nozzle for relative movement between a closed position in which it closes the open end of the nozzle and an open position clear of the open end of the nozzle,

the hinge being formed of resilient plastic material and comprising an arm having relatively rigid and relatively flexible portions which portions define a single hinge axis located spaced from and between the nozzle and the cap and which

- 12 -

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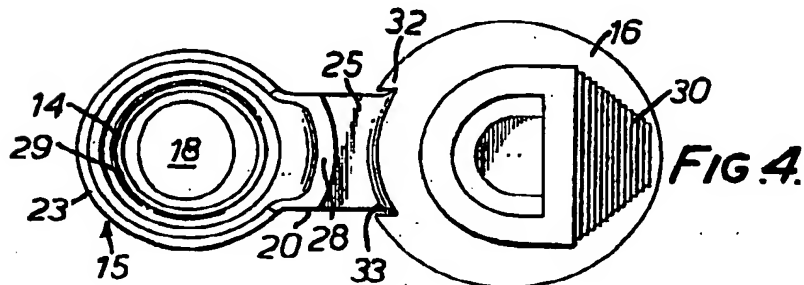
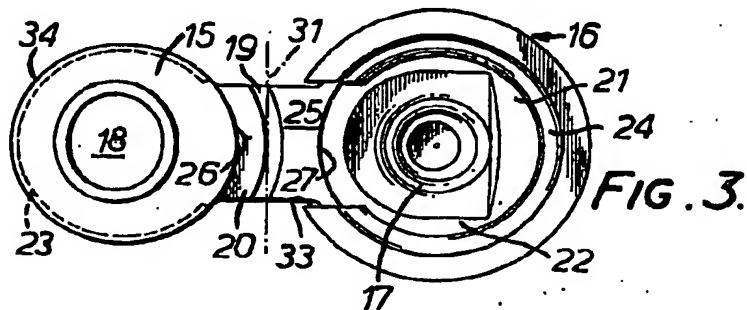
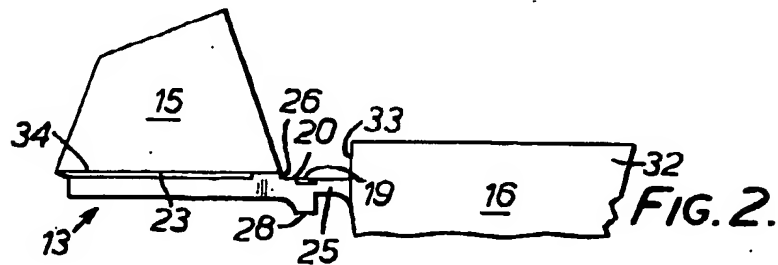
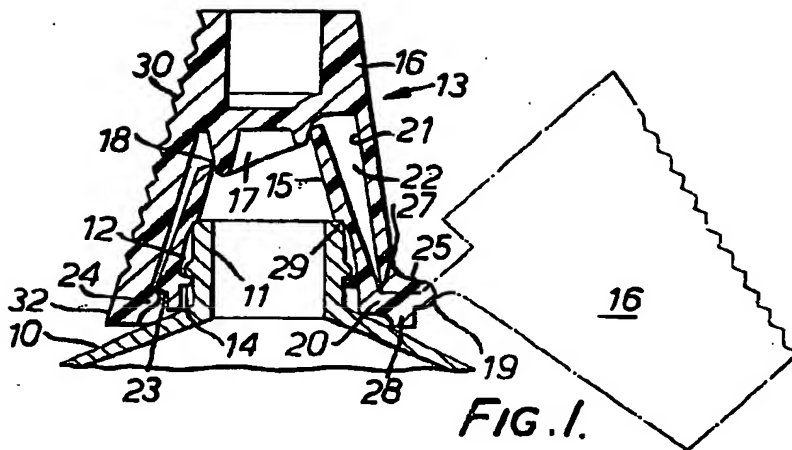
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portions have an interface which is curved in a plane transverse to the axis of the nozzle so that the line about which the plastic material preferentially tends to flex as the cap is moved towards the closed position is not coincident with the hinge axis whereby distortion of the plastic material of the hinge takes place to produce an opposing force, greater than due to the inherent bending resistance of the hinge material alone, which prevents the cap from moving further towards the closed position until overcome.

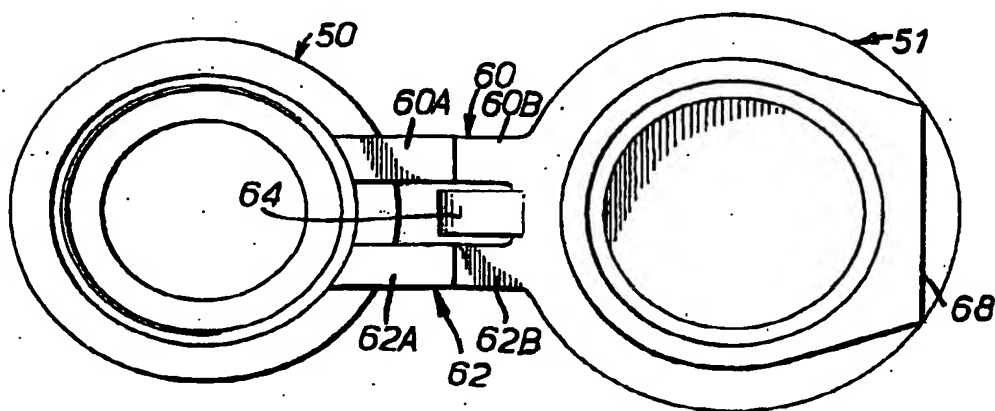
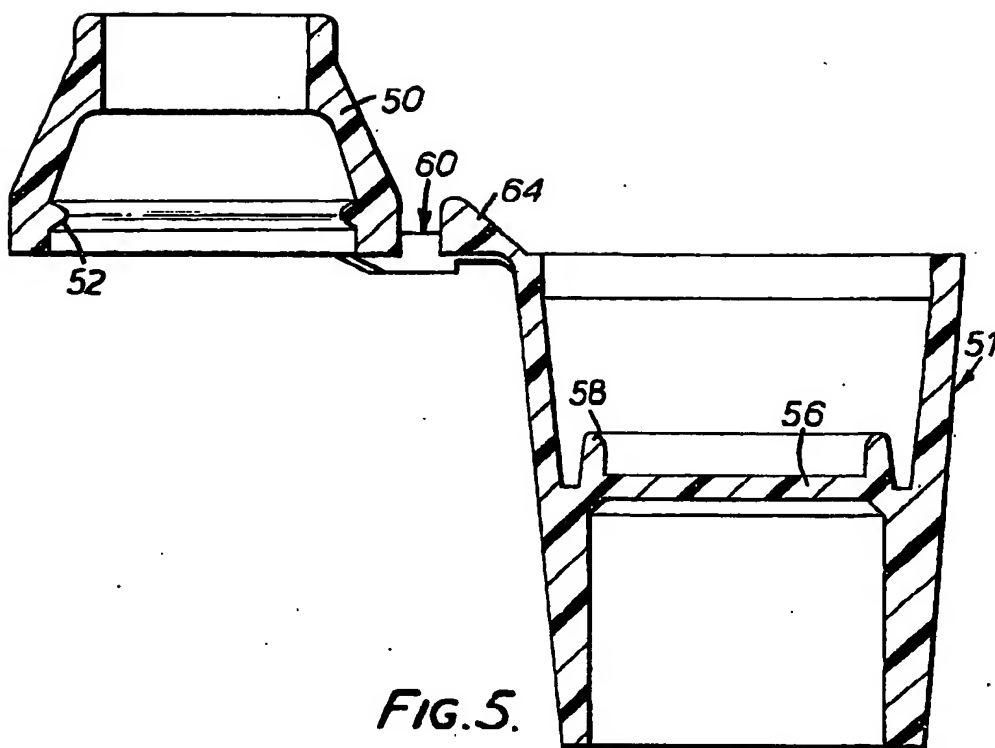
8. A dispenser according to claim 1, in which the said detent means is a member attached to the cap and arranged to engage the nozzle so as to produce the said force as the cap moves to the closed position, distortion of the plastic material at the point of engagement taking place when the force is overcome.

9. A dispenser according to claim 8, in which the hinge comprises two, generally parallel, side by side hinge arms of plastic material each joined at one end to the nozzle and at the other end to the cap and each comprising two joined integral portions one rigid and the other flexible, whereby the said single hinge axis is substantially coincident with a line passing through the join of the two portions of each hinge arm, the said detent member extending rigidly from the cap at a position between the two hinge arms whereby to engage the nozzle at a position between the two hinge arms as the cap is moved to the closed position.

- 13 -



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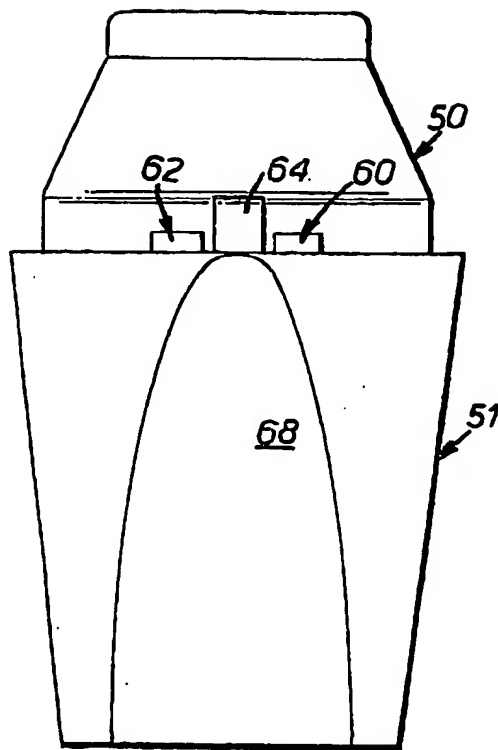


FIG. 7.

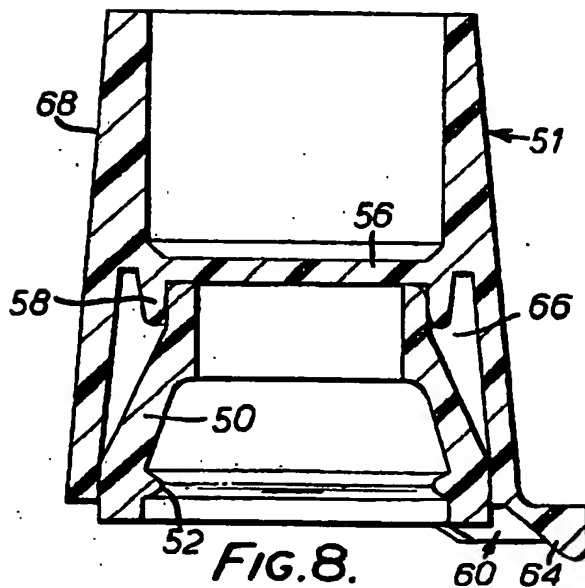


FIG. 8.

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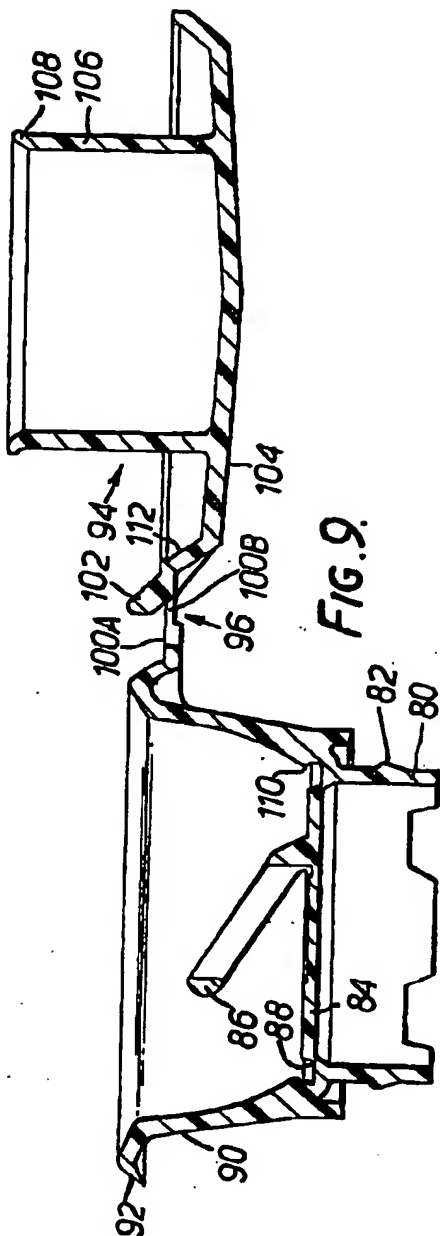


FIG. 9.

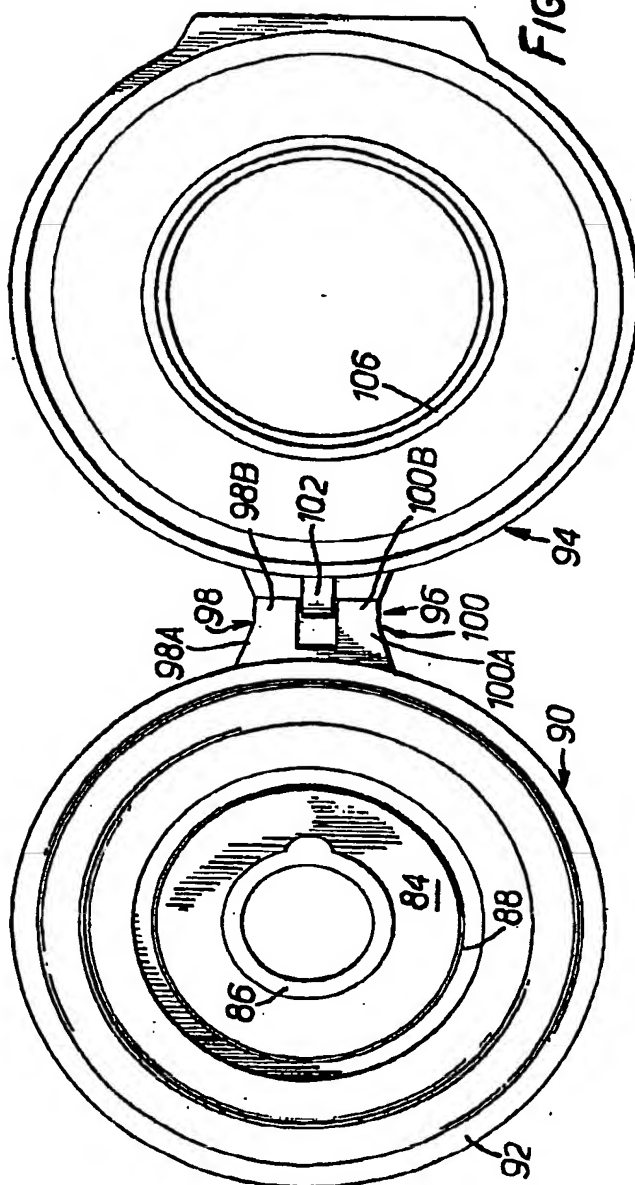


FIG. 10.

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